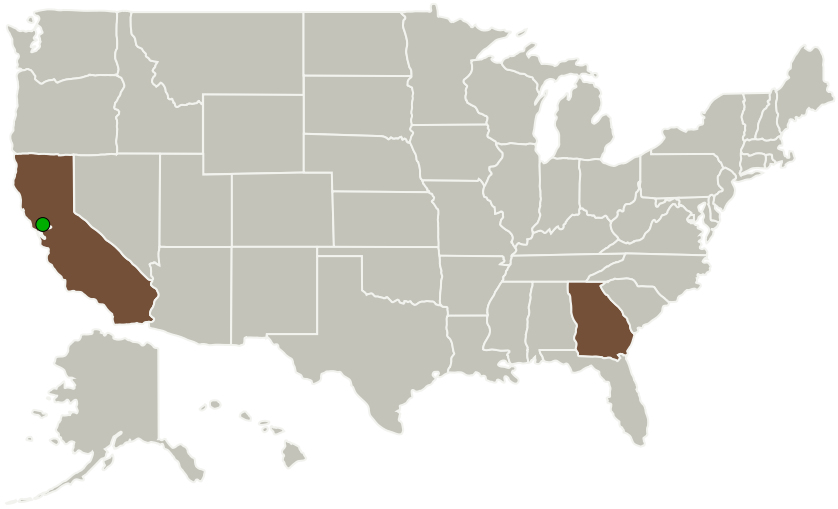
# Penetrator-Compatible Microfluidic Analyzer For Lipids, Amino Acid Chirality, and pH, Phase I

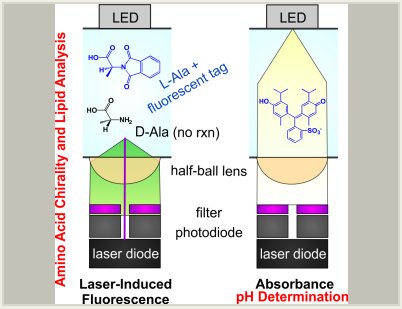
Completed Technology Project (2016 - 2017)

## Project Introduction

HJ Science & Technology (HJS&T) and Georgia Institute of Technology (GIT) propose to develop a novel penetrator-compatible technology capable of detecting key organic molecules, biomarkers, and indicators of habitability on primary astrobiological targets including icy moons like Europa and Enceladus. The proposed innovation is a novel combination of microfluidic automated colorimetric and fluorometric assays and a miniaturized integrated system of hydraulic microvalve and optical detection module. By leveraging hardware of the Small Body / Icy Moons Planetary Organic Analyzer currently under development at GIT combined with unique microfluidic automation innovations at HJS&T, the proposed STTR effort will expand the current detection capability to include lipids, chiral analysis of amino acids and pH measurement. The entire instrument package is small and robust enough to be compatible with multiple mission concepts, including the stringent volume, mass, and robustness requirements of a high-velocity kinetic impactor platform. In Phase I, scientists at HJ&T will develop microfluidic automation procedures of detecting chiral amino acids, lipids, and pH measurement with the pneumatic microvalve device and bench-top optical systems. Scientists at GIT will develop the hydraulic microvalve devices and the monolithically integrated optical system. The microfluidic automation procedures developed at HJS&T will then be transferred to GIT and adapted to the hydraulic microvalve and monolithic optical system format including testing with real samples.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

# Penetrator-Compatible Microfluidic Analyzer For Lipids, Amino Acid Chirality, and pH, Phase I

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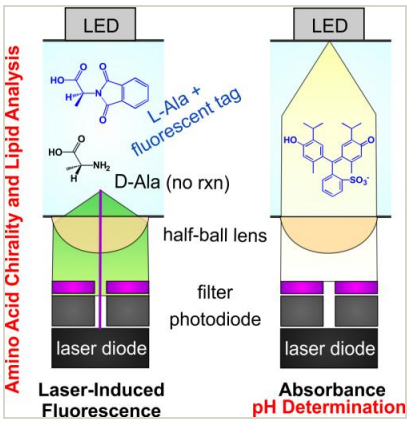
| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| HJ Science & Technology, Inc. | Lead Organization | Industry<br>Small Disadvantaged Business (SDB) | Berkeley, California |
| Ames Research Center(ARC) | Supporting Organization | NASA Center | Moffett Field, California |
| Georgia Institute of Technology-Main Campus(GA Tech) | Supporting Organization | Academia | Atlanta, Georgia |

| Primary U.S. Work Locations | |
|---|---|
| California | Georgia |

## Images




**Briefing Chart Image**
Penetrator-Compatible Microfluidic Analyzer For Lipids, Amino Acid Chirality, and pH, Phase I *(https://techport.nasa.gov/image/130695)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
HJ Science & Technology, Inc.

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

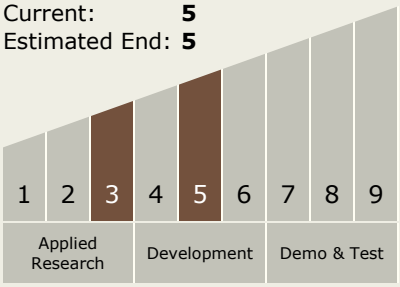
**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Amanda Stockton

## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.3 Optical Components

## Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System